

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 0 585 033 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
14.01.1998 Bulletin 1998/03

(51) Int Cl.⁶: **G08B 15/00**

(21) Application number: **93306466.9**

(22) Date of filing: **17.08.1993**

(54) Automatic surveillance camera equipment and alarm system

Automatische Überwachungskamera und Alarmsystem

Caméra de surveillance automatique et système d'alarme

(84) Designated Contracting States:
GB

(30) Priority: **21.08.1992 JP 222929/92**

(43) Date of publication of application:
02.03.1994 Bulletin 1994/09

(73) Proprietor: **NGK INSULATORS, LTD.**
Nagoya City Aichi Pref. (JP)

(72) Inventors:

- **Sakai, Yoshikazu**
Kagamihara-city, Gifu-prefecture 504 (JP)
- **Nagashima, Hogara**
Toyoake-city, Aichi-Prefecture 470-11 (JP)
- **Amalke, Masahiko**
Yokohama-city Kanagawa-prefecture 227 (JP)

- **Nagashima, Hisao**
Toyoake-city, Aichi-prefecture 470-11 (JP)

(74) Representative: **Paget, Hugh Charles Edward et al**
MEWBURN ELLIS
York House
23 Kingsway
London WC2B 6HP (GB)

(56) References cited:
GB-A- 2 202 954 **GB-A- 2 257 257**

- **PATENT ABSTRACTS OF JAPAN vol. 16, no. 568**
(P-1458)9 December 1992 & JP-A-04 218 888
(HITACH LTD) 10 August 1992
- **PATENT ABSTRACTS OF JAPAN vol. 15, no. 144**
(P-1189)11 April 1991 & JP-A-03 020 728
(MEIWA:KK) 29 January 1991

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 0 585 033 B1

Description

Field of The Invention

The present invention relates to a automatic surveillance camera equipment which can shoot a plurality of sensing zones one by one by using an infrared ray detecting sensor, and relates to an alarm system including said equipment.

Description of The Related Art

Hitherto, crime-prevention camera systems have been employed which shoot watching areas by using video cameras or movie cameras at periodic intervals. In addition, crime-prevention camera systems also have been employed which sense entering of an intruder by a sensor, send a signal to a crime-prevention camera through a control device to film the intruder. Such a device is described in JP-A-3 020 728. GB 2 202 954 describes such a device which also simultaneously transmits an alarm to a control center, and JP-A-4 218 888 describes such a device with a back-up power unit.

However, in the case of the above method which shoots a watching area with a conventional video camera or movie camera at periodic intervals, unnecessarily wasteful pictures frequently have been shot. Moreover, in the method using a video camera, a watching area of shooting needs illuminating always at a required level, and resolution of an image which is formed by a signal is low, thus, it is difficult to ascertain a person etc. shown in the photograph even if he is in proper illuminance, and there is also a problem in that the photograph is difficult to be accepted as legitimate evidence.

In addition, in the conventional system, the automatic surveillance camera equipment takes one or more pictures continuously at its position every time of sensing, but can not shoot at a position where the intruder has moved further. There also has been a problem its function stops when electrical wiring is cut off by an intruder.

The present inventor has studied about the above-mentioned problems, and has found that photography may be properly, safely performed by containing an infrared ray detecting sensor having a plurality of sensing zones, a control device, a camera unit, and a camera and so on together in a protective case even if an intruder moves, thus the present invention has been attained.

SUMMARY OF THE INVENTION

According to the present invention, there is provided a automatic surveillance camera equipment as described in claim 1.

When an intruder enters a watching area, the automatic surveillance camera equipment according to the present invention allows an infrared ray detecting sensor which has a plurality of sensing zones and senses

an object over a wide range, to detect an intruder every time the intruder moves from a zone to another zone and to send a signal to a control device, thereby, the device feeds a command signal to a camera unit, then the camera unit transmits a response signal to a camera in response to the command signal, the camera shoots a predetermined number of pictures by synchronizing a strobe and a camera shutter with each other, thus a variety of information of his figure and attitude shown by him within a watching area, can be exactly obtained.

Additionally, the automatic surveillance camera equipment according to the present invention may house major devices such as an infrared ray detecting sensor, a control device, a camera unit, a camera etc. together in a protective case, and may further contain a battery in the protective case if necessary. Moreover, the equipment also may be interlinked so that an alarm bell sounds when an intruder touches a protective case to break the equipment, there is therefore no possibility that the system may be smashed by the intruder.

In the case where an emergency battery is built into an equipment, which is operative even if power supply from outside stops in power failure and so on, then the equipment's function is never disabled even though wiring is cut by an intruder. The automatic surveillance camera equipment usually operates the above infrared ray detecting sensor and control device by connecting them to an outside power source, and a built-in battery automatically starts to operate each of the devices in the equipment in an emergency, e.g., when an intruder cuts off its wiring to an outside power source.

The automatic surveillance camera equipment according to the present invention can obtain distinct images by a negative color film, and also can shoot pictures of an intruder without being suspected by him, with an infrared strobe and film being charged. Moreover, a camera records a date, hour, and minute of his intrusion on the film, which may be therefore presented as evidence.

And further, an exposed roll film preferably may be automatically rewound so as to be hold in a patrone when another film is loaded into a camera, thus enabling the exposed film to be protected in case of breakage of the camera, and a voltage applied to a strobe preferably is raised to about 300 volts so as to strengthen the lighting to be able to shoot up to a more distant range, this threatening an intruder and also has an effect of preventing the equipment from being damaged by the intruder.

In addition, the operations such as starting and release are performed by employing a ciphered identification number system with a ten-key pad to prohibit being used by outsiders, and it is also possible to operate an equipment from outside by using an outside light emitting device (for example, an infrared ray emitting device) and transmitting a signal to a light-receiving section (element) equipped with the automatic surveillance camera equipment, instead of wiring. Additionally, the auto-

matic surveillance camera equipment maybe incorporated into a transmitting/receiving system, which includes a receiver for automatically receiving a signal of a notice from an infrared ray detecting sensor through a transmitter over a telephone line, for accumulating data from its information, and for performing an indication and printing corresponding to a predetermined processing of data. The system allows direct connection to a manager being outside, a security company, and a police station, thus a crime-prevention system of a larger scale also may be formed.

BRIEF DESCRIPTION OF THE DRAWING

Fig. 1 is a schematic diagram showing an embodiment of a situation where a automatic surveillance camera equipment A according to the present invention is arranged.

Fig. 2 is a block diagram showing components of the automatic surveillance camera equipment according to the present invention.

Fig. 3 is a schematic diagram showing an arrangement of an embodiment of the automatic surveillance camera equipment A according to the present invention.

Fig. 4 is a plan view showing sensing zones of a pyroelectricity type infrared ray detecting sensor used in the automatic surveillance camera equipment according to the present invention.

Fig. 5 (a), Fig. 5 (b) and Fig. 5 (c) are side views showing sensing zones of a pyroelectricity type infrared ray detecting sensor used in the automatic surveillance camera equipment according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention will be described in more detail in reference with illustrative embodiments hereafter, while it is not limited to those embodiments.

Fig. 1 is a schematic diagram showing an embodiment of a situation where a automatic surveillance camera equipment A according to the present invention is arranged. Fig. 2 is a block diagram showing components of the automatic surveillance camera equipment according to the present invention. Fig. 3 is a schematic diagram showing an arrangement of an embodiment of the automatic surveillance camera equipment A according to the present invention.

Reference numeral 1 is a pyroelectricity type infrared ray detecting sensor having a plurality of sensing zones, which senses infrared rays radiated from a body of an intruder 13 when the intruder 13 enters a watching area, then sends a signal to a control device 2, and an alarm bell 3 simultaneously sounds by a command signal from the control device 2. In addition, the control device 2 notifies a control center 11 through a telephone line such as NTT (Nippon Telegram and Telephone Corporation) synchronous with sending a command signal 4 to a camera unit 5 in response to the signal transmitted

from the infrared ray detecting sensor 1. On receiving the notice, the control center 11 notifies their user 12 by telephone and requests dispatch of a patrol car.

The camera unit 5 transmits a signal to a camera 7 when receiving the command signal 4 from the control device 2, then automatically performs photography by synchronizing a strobe 8 and a camera shutter each other. In response to the signal from the camera unit 5, the camera 7 pursues the intruder 13 at several times every time when the intruder 13 moves within the watching area, so as to take predetermined number of picture of his figures and attitudes continuously.

The infrared ray detecting sensor 1 preferably has a plurality of sensing zones, and a thermal type sensor such as a thermopile, a thermistor bolometer, and a pyroelectricity element can be usually used. Especially, a pyroelectricity type infrared ray detecting sensor includes a three-dimensional watching area, for example, as shown in Fig. 4, Fig. 5 (a), Fig. 5 (b) and Fig. 5 (c), and more particularly includes sensing zones B at every predetermined angle X respectively, over a horizontal range as shown in Fig. 4 of a plan view, and sensing zones C at each of predetermined angle Y_1, Y_2, Y_3, \dots , respectively, over a vertical range as shown in Fig. 5 of a side view. In particular, a passive infrared ray detecting sensor may be used as a pyroelectricity type infrared ray detecting sensor. Moreover, depending on the situation of a mounting position of the automatic surveillance camera equipment according to the present invention, it is also possible to set the maximum watching distance in the horizontal direction or in the vertical direction. As the infrared ray detecting sensor can sense an intruder every time when he moves between sensing zones, using the infrared ray detecting sensor allows taking a plurality of pictures of his figures and attitudes within a watching area at a variety of angle.

The camera 7 is in such a way that an exposed roll film may be automatically rewound so as to be automatically held in a patrone when another film is loaded into the camera. Moreover, a date, hour, and minute of the photography is automatically recorded on the exposed film, and a pilot lamp lights on when automatically continuous photography has been completed. The camera 7 is equipped with a rated 300 volts strobe 8 so as to supply electric power raised to 300 volts. Alternatively, the camera, strobe, and so on can be replaced with an infrared camera and infrared strobe which are capable of shooting even in a dark field condition. In addition, the equipment of the embodiment contains all major devices such as the infrared sensor 1, control device 2, camera unit 5, camera 7, strobe 8, battery 14 etc. within the protective case 9 together in order to prevent the automatic surveillance camera from being broken down or removed by an intruder 13. When the intruder touches with protective case 9 to break down the case 9, a vibration sensor (is not shown) operates and threatening alarm bell 10 sounds to make him escape.

Moreover, each of said devices can start and oper-

ate with the aid of a backup device including a built-in charging battery 14 even in power outage, and also the equipment can cope with the situation when wiring is cut off by an intruder. A negative color film is loaded in camera 7 so as to shoot the intruder exactly.

In Fig. 3, reference numeral 15 shows a light-receiving section (element). The light-receiving section 15 is equipped with the automatic surveillance camera equipment A, and it is possible to operate the camera equipment A from outside by transmitting a signal from an outside light emitting device (not shown) to the light-receiving section 15.

In the automatic surveillance camera equipment according to the present invention, the infrared ray detecting sensor senses an intruder when he enters, then transmits a command signal to the camera unit through the control device, and the camera quickly responds to the command signal and can fast performs automatically continuous photography of distinct image pictures having high resolution without overlooking any minute evidence by synchronizing the strobe and camera shutter each other.

Especially, the infrared ray detecting sensor of the present invention has a plurality of sensing zones which can sense over a wide angle, senses and outputs a signal every time when an intruder moves between zones, therefore, the sensor is very effective in catching motion of the intruder exactly in all its directions and grasping his figures and behavior. The automatic surveillance camera equipment of the present invention does not take a plurality of pictures of the same attitude at a time of sensing continuously like a conventional crime-prevention camera system, but shoots only when the intruder moves between zones, thus, film can be economically used.

When an intruder enters in night, a strobe and a camera shutter are synchronized each other by a command signal transmitted from an infrared sensor even in the darkness where there is no illuminating facilities, then distinct pictures of high resolution may be obtained. Loading an infrared film and infrared strobe enables photography to be made without being suspected by an intruder.

Additionally, the automatic surveillance camera equipment according to the present invention contains major devices such as an infrared sensor, a control device, a camera, a camera unit, a strobe etc. together in a protective case, and further a battery in the protective case if necessary, and this allows wiring to the outside of the equipment to be unnecessary, then can prevent the equipment from being in function failure due to cutting off wiring by an intruder, and also costs of wiring may be reduced.

prising:

an infrared ray detecting sensor (1) for detecting an intruder within a watched area and transmitting an output signal to a control device;
a camera unit (5) having a camera (7) and a strobe unit (8),
a control device (2) for sending command signals to the camera unit (5) in response to signals from the infrared ray detecting sensor (1);
the camera unit (5) supplying control signals to the camera (7) in response to the command signals from the control device (2);
the camera synchronizing the strobe and the camera shutter with each other on the control signals from the camera unit (5) to effect automatic camera shooting;

characterized by:-

the sensor (1) being adapted to sense in a plurality of sensing zones, whereby the equipment is arranged to perform photography of an intruder in each of the sensing zones of the infrared ray detecting sensor when the intruder enters the watched area.

2. An automatic surveillance camera equipment according to claim 1 having a built-in battery (14) which operates automatically when an exterior power supply stops.
3. An automatic surveillance camera equipment according to claim 1 or claim 2 having a protective case (9) accommodating the infrared ray detecting sensor (1), the control device (2), and the camera unit (5).
4. An automatic surveillance camera equipment according to any one of the preceding claims wherein a film is automatically rewound when another film is loaded in the camera (7), and said exposed film is automatically held into a patrone.
5. An automatic surveillance camera equipment according to any one of the preceding claims having an alarm bell (10) which operates simultaneously when an intruder enters the watched area.
6. An automatic surveillance camera equipment according to any one of claims 1 to 4 further comprising a vibration sensor and an alarm bell (10) which are operative when an intruder touches the protective case.

Claims

1. An automatic surveillance camera equipment, com-

55

Patentansprüche

1. Automatisches Überwachungskamerasystem, um-

fassend:

einen Sensor (1) zur Erfassung von Infrarotstrahlen zum Detektieren eines Eindringlings innerhalb eines bewachten Bereichs und Übermitteln eines Ausgangssignals an eine Steuervorrichtung;

eine Kameraeinheit (5) mit einer Kamera (7) und einer Blitzlichteinheit (8);

eine Steuervorrichtung (2) zum Senden von Befehlssignalen an die Kameraeinheit (5) als Reaktion auf Signale aus dem Sensor (1) zur Erfassung von Infrarotstrahlen;

wobei die Kameraeinheit (5) als Reaktion auf die Befehlssignale aus der Steuervorrichtung (2) Steuersignale an die Kamera (7) liefert;

wobei die Kamera den Blitz und den Kameraerschluß auf die Steuersignale aus der Kameraeinheit (5) miteinander synchronisiert, um automatische Kameraaufnahmen zu bewirken;

dadurch gekennzeichnet, dass:

der Sensor (1) ausgebildet ist, die Erfassung in einer Vielzahl an Erfassungszonen durchzuführen, wodurch die Ausrüstung angeordnet ist, einen Eindringling in jeder der Erfassungszonen des Sensors zur Erfassung von Infrarotstrahlen zu fotografieren, wenn er in den bewachten Bereich eindringt.

2. Automatisches Überwachungskamerasystem nach Anspruch 1 mit einer eingebauten Batterie (14), die automatisch arbeitet, wenn eine externe Stromversorgung abbricht.
3. Automatisches Überwachungskamerasystem nach Anspruch 1 oder 2 mit einem Schutzgehäuse (9), in dem der Sensor (1) zur Erfassung von Infrarotstrahlen, die Steuervorrichtung (2) und die Kameraeinheit (5) untergebracht sind.
4. Automatisches Überwachungskamerasystem nach einem der vorhergehenden Ansprüche, worin ein Film automatisch zurückgespult wird, wenn ein anderer Film in die Kamera (7) eingelegt wird, und der belichtete Film automatisch in einer Patrone gehalten wird.
5. Automatisches Überwachungskamerasystem nach einem der vorhergehenden Ansprüche mit einer Alarmglocke (10), die gleichzeitig betrieben wird, wenn ein Eindringling in den bewachten Bereich eindringt.
6. Automatisches Überwachungskamerasystem nach

einem der Ansprüche 1 bis 4, weiters umfassend einen Vibrationssensor und eine Alarmglocke (10), die in Betrieb gehen, wenn ein Eindringling das Schutzgehäuse berührt.

Revendications

1. Equipement à caméra de surveillance automatique, comprenant :

un capteur de détection de rayons infrarouge (1) pour détecter un intrus dans une zone surveillée et transmettre un signal de sortie à un dispositif de contrôle ;
une unité de caméra (5) ayant une caméra (7) et une unité de transfert (8),
un dispositif de commande (2) pour transmettre des signaux de commande à l'unité de caméra (5) en réponse à des signaux du capteur de détection infrarouge (1) ; l'unité de caméra (5) fournissant des signaux de commande à la caméra (7) en réponse aux signaux de commande du dispositif de commande (2) ;
la caméra synchronisant le transfert et l'obturateur de la caméra l'un avec l'autre sur les signaux de commande de l'unité de caméra (5) pour effectuer une prise de vue avec la caméra automatique ;

caractérisée par : -

le capteur (1) étant adapté pour détecter dans une pluralité de zones de détection, de la sorte l'équipement est agencé pour accomplir une photographie d'un intrus dans chacune des zones de détection du capteur de détection à rayons infrarouge lorsque l'intrus entre dans la zone surveillée.

2. Equipement à caméra de surveillance automatique selon la revendication 1 ayant une batterie incorporée (14) qui fonctionne automatiquement lorsqu'une alimentation extérieure s'arrête.
3. Equipement à caméra de surveillance automatique selon la revendication 1 ou la revendication 2 ayant un boîtier de protection (9) recevant le capteur de détection de rayonnement infrarouge (1), le dispositif de commande (2), et l'unité de caméra (5).
4. Equipement à caméra de surveillance automatique selon l'une quelconques des revendications précédentes dans lequel un film est automatiquement rembobiné lorsqu'un autre film est chargé dans la caméra (7), et ledit film exposé est automatiquement maintenu dans un protecteur.
5. Equipement à caméra de surveillance automatique selon l'une quelconque des revendications précé-

dentés ayant un timbre de sonnerie (10) qui fonctionne simultanément lorsqu'un intrus entre dans la zone surveillée.

6. Equipement à caméra de surveillance automatique selon l'une quelconque des revendications 1 à 4 comprenant de plus un capteur de vibrations et un timbre de sonnerie (10) qui fonctionnent lorsqu'un intrus touche le boîtier de protection.

10

15

20

25

30

35

40

45

50

55

FIG. 1

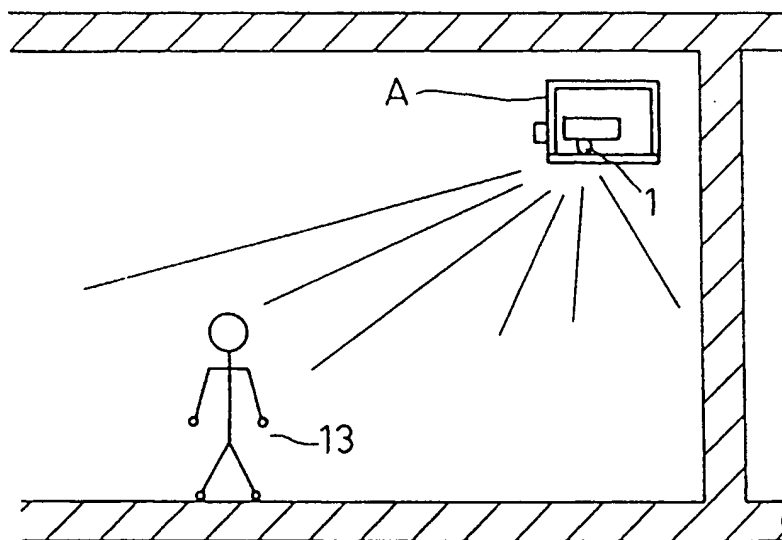


FIG. 2

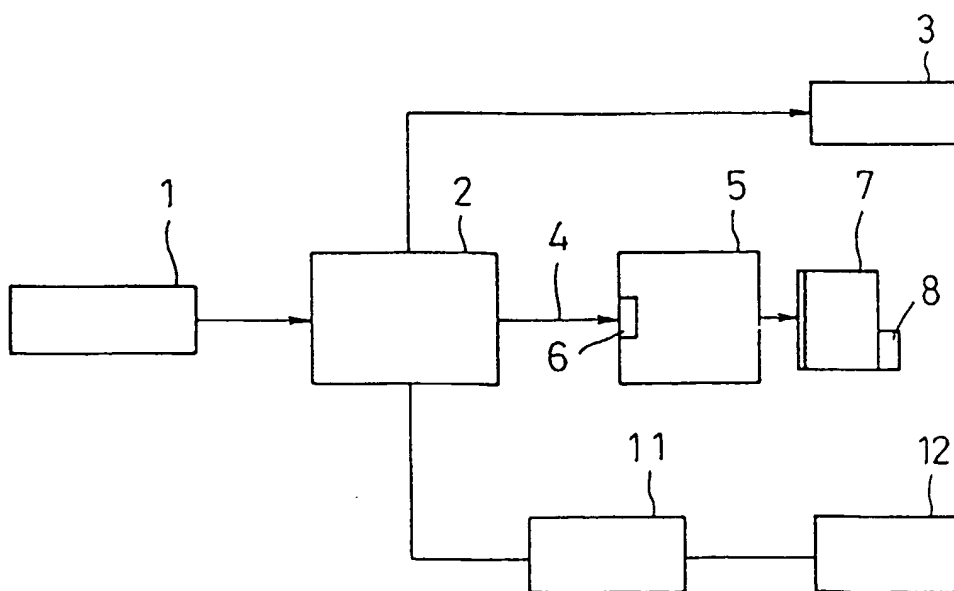


FIG. 3

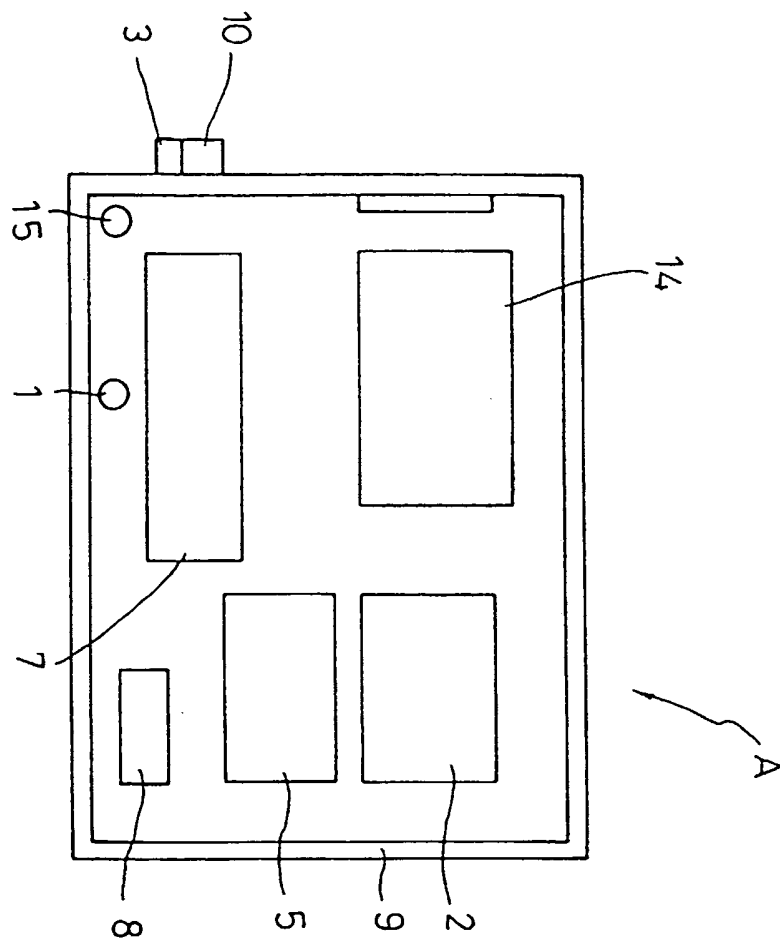


FIG. 4

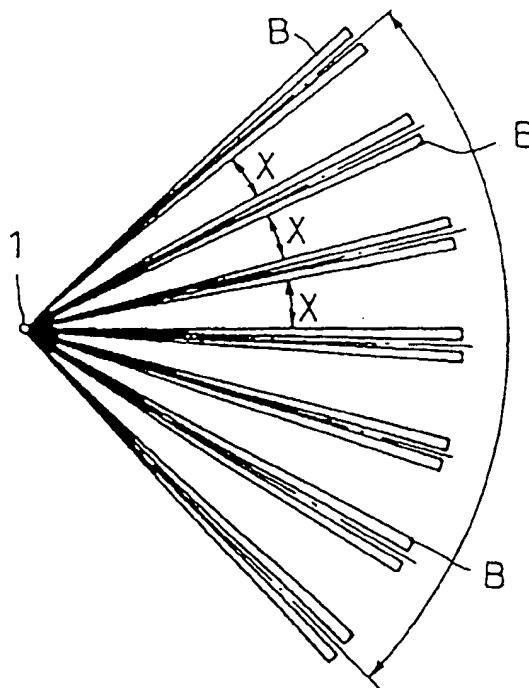


FIG. 5

(a)

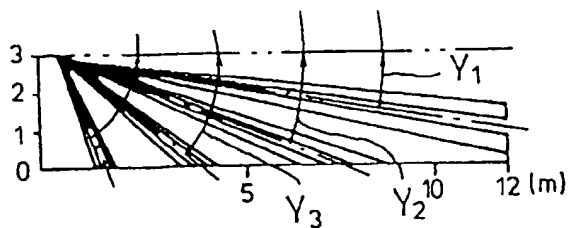


FIG. 5

(b)

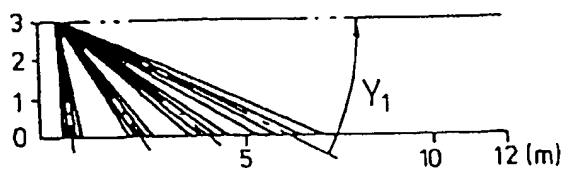
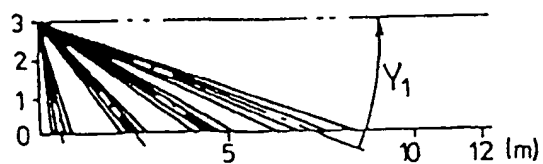


FIG. 5

(c)



THIS PAGE BLANK (USPTO)